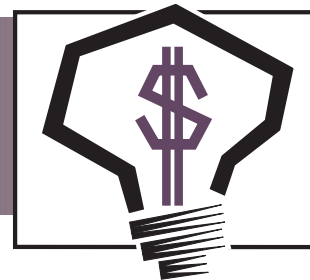


# INVENTIONS & INNOVATION

## Success Story



## NEW TECHNOLOGY KEEPS COMPANIES AND CONSUMERS IN HOT WATER

### BENEFITS

- Reduces energy use by recycling energy lost down drains
- May recover up to 85% of waste energy—hot or cold
- In a residential application, saves an average family of four approximately 34% in heating energy and costs
- Permits triple the shower capacity of an average electric water heater at half the cost of an average hot shower and reduces demand charges
- Eliminates production bottlenecks caused by running out of hot water
- Offers low set-up and operating costs
- Reduces scale formation and maintenance required to maintain peak efficiency by self-cleaning
- Can be installed on nearly any fluid heat transfer system
- Improves solar heating economics
- Enables a tankless water heater to provide residential space and water heating while eliminating standby loss and boiler maintenance

“My GFX allows me to increase the capacity of my 40 gallon, LP-fired water heater used to provide heat in a 2000 square foot home and domestic hot water for a family of four.”

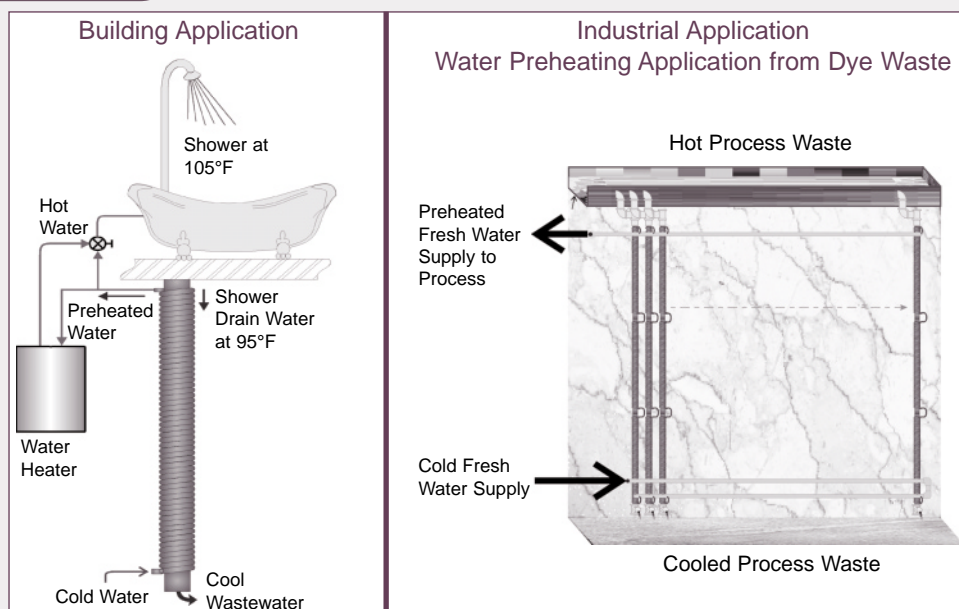
— Matt in Vermont

## WASTE FLUID ENERGY RECOVERY SYSTEM RECYCLES WASTE ENERGY AND CUTS UTILITY BILLS

How many times have you run out of hot water because someone else had turned on the washing machine or run the dishwasher? Maybe you were the last person up on a Saturday morning and were treated to a lukewarm shower. This is an all too familiar occurrence for many consumers, and process industries often encounter similar problems. How do you keep the factory floor open for food processing if heated water isn't in abundant supply? Industries also pay demand charge premiums when using electricity to heat or cool water during peak consumption periods.

Hot water is a precious commodity in most homes and businesses. There never seems to be enough of it when you need it. Approximately 80% to 90% of all hot water energy flows down the drain, carrying with it up to 955 kilowatt-hours (kWh) of energy (EIA estimate, worth about \$80 billion at 8.5 cents per kWh) in the United States alone. Various heat exchangers have been created to help alleviate some of the energy loss in industry, commercial, and residential applications. However, in many cases these heat exchangers have proven expensive and inefficient.

### GFX SYSTEM



**The GFX system, which can be installed on nearly any fluid heat transfer system, saves energy and cuts utility costs for consumers in residential, commercial, and industrial settings.**



## Solution

WaterFilm Energy, Inc., has developed a new counterflow heat exchanger, named the GFX System, which uses double-walled, vented copper pipe to recover heat/cool energy from wastewater to preheat/precool incoming water. The system works while the drain and supply lines are concurrently in use, for example, when someone is draining process flows or when hot water from a shower or faucet is flowing down the drain. Hot waste flowing through the drain dispenses more than half its heat to the incoming water, warming it before it reaches the water heater and/or fixtures. By recovering energy that is ordinarily lost down the drain, GFX significantly reduces the amount of energy required to heat or cool water. This reduction in energy can equate to approximately 50% lower utility costs for the consumer from heating or cooling water.

Unlike competing heat exchangers, the invention uses a thin falling film principle to transfer heat from waste, thereby taking advantage of ultra-high heat transfer coefficients, with balanced mass flow rates of waste and incoming water for optimum efficiency. In addition, GFX has a small footprint. Four times GFX's wetted area is required (Department of Energy analysis) to achieve similar performance with conventional, single-walled, non-vented shell and tube heat exchangers having comparable tube diameters. The system uses only copper pipes because copper provides the longest possible service life, the most productive heat transfer, and minimal maintenance worries. In addition, the system's lack of internal welds eliminates cross-contamination problems caused by weld failures and tube leaks common to shell and tube heat exchangers, ensuring low maintenance costs. Optional electroless nickel, tin, stainless steel, or polymer coatings are available to protect against corrosive fluids or allow for food processing or other applications.

## Results

The technology offers remarkable reductions in water heating and cooling costs in commercial, residential, and industrial applications. In parts of the United States where electricity costs 8.5 to 17 cents per kWh, GFX could save 20 to 40 cents per shower, resulting in average annual savings of \$250 to \$500 for a four person household. For a \$300 to \$500 investment, consumers could run three hot showers simultaneously or one right after the other and still reduce their water heating bills by 30% to 50%. (Savings will vary based on use. See Web sites for details.) These kinds of figures give the GFX waste fluid recovery system a distinct advantage over more expensive, less efficient water heating and cooling systems.

WaterFilm Energy, Inc., first commercialized its GFX technology in 1997. Currently, more than 500 units are in operation in the United States and additional systems have been installed in Australia and New Zealand. Doucette Industries currently holds a license for manufacturing, marketing, and distributing GFX in residential, commercial, and industrial markets. The system is highlighted at: [www.endlessshower.com](http://www.endlessshower.com). The technology was featured in a television broadcast of Bob Vila's Home Again in September 1999 and rebroadcast on March 13, 2000. Details about the installation can be found on the show's Web site ([www.bobvila.com](http://www.bobvila.com)).

## Sample Applications

Heat and cold recovery sources include: textile plants, pulp mills, paper mills, canneries, food processors, printed circuit washers, film developers, steam condensate lines, district heating and cooling systems, hotels, dormitories, hospitals, military housing, laundries, clothes washers, dishwashers, pot washers, showers, tunnel finishers, dye tanks, bottle washers, saunas, car washers, heat pumps, ice machines, homes, beauty salons, prisons, public showers, military bases, and ships.

## Current Incentives

Minnesota Power's Residential Rebate Program – [www.mpelectric.com/rescat/#triplee](http://www.mpelectric.com/rescat/#triplee)

Oregon State Energy Tax Credits – [www.energy.state.or.us/txcdts.htm](http://www.energy.state.or.us/txcdts.htm)

Check with your utility or state/municipality for rebates or tax credits offered.



The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and conduct early development. Ideas that have significant energy savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

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